Amendments to the Claims:

This Listing of Claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1. (previously presented) An interferometer apparatus comprising:

a light source configured to emit a beam of measuring light;

interferometer optics configured to direct the beam of measuring light toward an object, the interferometer optics comprising optical components symmetrically arranged with respect to a first optical axis;

a detector system configured to detect an interference of a first portion of the beam of measuring light having interacted with the object and a second portion of the beam measuring light;

wherein light in the beam of measuring light has at each location in a cross section of the beam, a radial component polarized in a direction radially oriented with respect to the first optical axis, and a tangential component polarized in a direction orthogonal to the radial component;

wherein the interferometer optics comprises a polarization system including a polarization changing member positioned in the beam of measuring light, wherein the polarization changing member introduces a relative suppression of one of the radial component and the tangential component of light of the beam of measuring light with respect to the other component; and

wherein an amount of the suppression of the one of the radial component and the tangential component gradually increases with increasing distance from the first optical axis.

2. (original) The interferometer apparatus according to claim 1, wherein the polarization system comprises a quarter wave plate positioned in a beam path of the beam of measuring light between the light source and the polarization changing member.

3. (original) The interferometer apparatus according to claim 2, wherein the light source is a source of linearly polarized light.

4. (original) The interferometer apparatus according to claim 2, wherein the polarization system further comprises a second polarizer positioned in the beam path between the light source an the quarter wave plate, wherein the second polarizer is a linear polarizer of a substantially constant polarization strength across its cross section.

5. (original) The interferometer apparatus according to claim 2, wherein the polarization changer member suppresses the tangential component.

6. (original) The interferometer apparatus according to claim 5, wherein the polarization system further comprises a half wave plate positioned in the beam of measuring light downstream of the polarization changing member.

7. (original) The interferometer apparatus according to claim 1, wherein the polarization changer member comprises a dome shaped optical interface.

8. (original) The interferometer apparatus according to claim 7, wherein the optical interface is of a parabolic shape.

9. (original) The interferometer apparatus according to claim 7, wherein the optical interface comprises a plurality of dielectric layers.

10. (previously presented) An interferometer apparatus comprising:

a light source configured to emit a beam of measuring light;

interferometer optics configured to direct the beam of measuring light toward an object, the interferometer optics comprising optical components symmetrically arranged with respect to a first optical axis;

a detector system configured to detect an interference of a first portion of the beam of measuring light having interacted with the object and a second portion of the beam of measuring light;

wherein light in the beam of measuring light has at each location in a cross section of the beam a radial component polarized in a dir3ection radially oriented with respect to the first optical axis and a tangential component polarized in a direction orthogonal to the radial component;

wherein the interferometer optics comprises a polarization system including a polarization changing member positioned in the beam of measuring light, wherein the polarization changer member introduces at least one of a relative suppression of one of the radial component and the tangential component of light of the beam of measuring light with respect to the other component, and a phase shift between the radial component and the tangential component, and wherein the polarization changing member is rotatable about the first optical axis.

11. (original) The interferometer apparatus according to claim 10, wherein the polarization system is configured such that the beam of measuring light is substantially circularly polarized light upstream of the polarization changing member, and wherein the polarization changing member is configured such that the beam of measuring light is substantially linearly polarized light downstream of the polarization changing member.

12. (previously presented) The interferometer apparatus according to claim 10, wherein an amount of the relative suppression and of the phase shift is substantially constant over substantially the whole cross section of the beam of measuring light directed toward the object.

13. (original) The interferometer apparatus according to claim 10, wherein the polarization system further comprises a mask rotatably connected with the polarization changing member, wherein the mask comprises at least one sector blocking light of the beam of measuring light, the sector extending in a circumferential direction about the first optical axis over more than 140°.

14. (original) The interferometer apparatus according to claim 13, wherein the polarization changing member comprises a half wave plate rotatably connected to the

mask such that the mask is rotatable about the first optical axis twice as fast as the polarization changing member.

15. (original) The interferometer apparatus according to claim 13, wherein the polarization changing member comprises a quarter wave plate rotatably fixedly connected to the mask.

16. (original) The interferometer apparatus according to claim 10, wherein the polarization changing member comprises at least one sector with respect to the first optical axis, the sector extending in a circumferential direction about the first optical axis over less than 30°, wherein an amount of the relative suppression and of the phase shift is substantially constant in the sector.

17. (original) The interferometer apparatus according to claim 16, wherein a first sector includes a region around the first optical axis.

18. (previously presented) The interferometer apparatus according to claim 16, wherein the polarization changing member comprises a plurality of radial sectors circumferentially offset about the first optical axis with respect to each other, wherein amounts of the relative suppression and of the phase shift in the radial sectors are substantially equal to each other.

19. (original) The interferometer apparatus according to claim 10, further comprising a mirror having a substantially flat mirror surface positioned on the first optical axis and substantially orthogonal thereto.

20. (original) The interferometer apparatus according to claim 19, wherein the mirror comprises a metal substrate having a surface providing the mirror surface.

21. (original) The interferometer apparatus according to claim 20, wherein the metal comprises silver and wherein the mirror surface is covered with a protective layer.

22. (original) The interferometer apparatus according to claim 19, wherein the mirror comprises a glass substrate having a surface providing the mirror surface.

23. (original) The interferometer apparatus according to claim 19, wherein the mirror comprises a plurality of dielectric layers.

24. (original) The interferometer apparatus according to claim 19, wherein the plurality of dielectric layers is configured such that a reflective index of light polarized transversely to the mirror surface is increased with respect to mirror being not provided with the plurality of dielectric layers.

25. (original) The interferometer apparatus according to claim 10, further comprising a mirror and an auxiliary optics having a plurality of optical components symmetrically arranged with respect to a second optical axis, wherein the auxiliary optics is mountable with respect to the interferometer optics such that the first and second optical axes substantially coincide, and such that a focus of the beam of measuring light is imaged, by the auxiliary optics onto a mirror surface of the mirror.

26. (original) The interferometer apparatus according to claim 26, wherein the auxiliary optics is rotatable about the first optical axis.

27. (currently amended) A method of manufacturing a substrate having an optical surface, the method comprising:

providing an interferometer apparatus having an interferometer optics providing a beam of measuring light, wherein light in the beam of measuring light has at each location in a cross section of the beam a radial component polarized in a direction radially oriented with respect to an optical axis, and a tangential component polarized in a direction orthogonal to the radial component;

polarizing the beam of measuring light such that the tangential component continuously increases relative to the radial component with increasing distance from the optical axis;

arranging the substrate in the beam of measuring light;

interferometrically determining a surface map of the optical ~~surface; and~~ surface;

determining deviations of the optical surface of the substrate from a target shape thereof in dependence of the surface ~~map.~~map; and

machining the first surface of the optical substrate in dependence of the determined deviations.

28. (previously presented) The method according to claim 27, wherein the determining of the surface map of the optical surface comprises:

interferometrically taking a first measurement of wavefronts generated by reflecting the beam of measuring light from the optical surface;

rotating the substrate about an optical axis of the interferometer optics; and

interferometrically taking a second measurement of wavefronts generated by reflecting the beam of measuring light from the optical surface;

wherein the surface map is determined in dependence of the first and second measurements.

29. (original) The method according to claim 28, wherein the determining of the surface map of the optical surface further comprises:

positioning a mirror in a focus of the beam of measuring light; and

interferometrically taking a third measurement of wavefronts generated by reflecting the beam of measuring light from the mirror;

wherein the surface map is further determined in dependence of the third measurement.

30. (currently amended) A method of manufacturing a substrate having an optical surface, the method comprising:

providing an interferometer apparatus having an interferometer optics providing a beam of measuring light;

polarizing the beam of measuring light such that light of the beam is substantially linearly polarized in a polarization direction which is substantially constant across a cross section of the beam;

rotating the polarization direction about an optical axis;

arranging the substrate in a beam of measuring light while rotating the polarization direction;

detecting measuring light having interacted with the substrate at plural orientations of the polarization direction about the optical axis;

interferometrically determining a surface map of the optical surface based on the detected measuring ~~light; and~~ light;

determining deviations of the optical surface of the substrate from a target shape thereof in dependence of the surface ~~map.~~map; and

machining the first surface of the optical substrate in dependence upon the determined deviations.

31. (previously presented) The method according to claim 30, wherein the cross section of the beam of measuring light is contained within a sector which has a circumferential extension about the optical axis of less than 30°, and wherein the sector is rotated about the optical axis together with the polarization direction.

32. (original) The method according to claim 31, wherein the determining of the surface map of the optical surface comprises:

interferometrically taking at least one measurement during a time period in which the sector is rotated by at least 170°.

33. (previously presented) The method according to claim 30, wherein the cross section of the beam of measuring light is a substantially circular cross section about the optical axis.

34. (previously presented) The method according to claim 33, wherein the determining of the surface map of the optical surface comprises:

interferometrically taking at least one measurement by performing a plurality of partial measurements with the beam of measuring light polarized in different polarization directions; and

averaging results of the plurality of partial measurements.

35. (previously presented) The method according to claim 30, wherein the determining of the surface map of the optical surface comprises:

interferometrically taking a first measurement of first wavefronts generated by reflecting the beam of measuring light from the optical surface;

rotating the substrate about an optical axis of the interferometer optics; and

interferometrically taking a second measurement of second wavefronts generated by reflecting the beam of measuring light from the optical surface;

wherein the surface map is determined in dependence of the first and second measurements.

36. (previously presented) The method according to claim 35, wherein the determining of the surface map of the optical surface further comprises:

positioning a mirror in a focus of the beam of measuring light; and

interferometrically taking a third measurement of third wavefronts generated by reflecting the beam of measuring light from the mirror;

wherein the surface map is further determined in dependence of the third measurement.

37. (original) The method according to claim 36, wherein the focus is provided by the interferometer optics.

38. (original) The method according to claim 36, wherein the interferometer optics provides a first focus of the beam of measuring light and wherein an auxiliary optics is provided by imaging the first focus into a second focus, and wherein the mirror is positioned in the second focus.

39. (previously presented) The method according to claim 27, further comprising:

machining the surface of the substrate in dependence of the determined deviations.

Claim 40. (canceled)

41. (currently amended) The method according to ~~claim 39 or 40,~~ claim 39, wherein the machining is only performed if the deviations exceed a predetermined threshold.

42. (currently amended) The method according to ~~claim 39 or 40,~~ claim 39, wherein the determining of deviations and the machining are repeatedly performed.

43. (previously presented) The method according to claim 39, further comprising a finishing of the surface of the substrate.

44. (previously presented) The method according to claim 43, wherein the finishing comprises applying a coating to the surface of the substrate.

45. (original) The method according to claim 44, wherein the coating comprises at least one of a reflective coating, an anti-reflective coating and a protective coating.

46. (previously presented) The method according to claim 39, wherein a ratio of a diameter of the substrate over a radius of the surface of the optical substrate is higher than 0.4.

47. (previously presented) The method according to claim 39, wherein the ratio is higher than 0.55.

48. (currently amended) A method of manufacturing an optical system comprising a plurality of lenses, wherein at least one lens of the plurality of lenses is an optical substrate manufactured by the method ~~according to claim 39.~~ comprising:

providing an interferometer apparatus having an interferometer optics providing a beam of measuring light, wherein light in the beam of measuring light has at each location in a cross section of the beam a radial component polarized in a direction radially

oriented with respect to an optical axis, and a tangential component polarized in a direction orthogonal to the radial component;

polarizing the beam of measuring light such that the tangential component continuously increases relative to the radial component with increasing distance from the optical axis;

arranging the substrate in the beam of measuring light;

interferometrically determining a surface map of the optical surface;

determining deviations of the optical surface of the substrate from a target shape thereof in dependence of the surface map; and

machining the first surface of the optical substrate in dependence of the determined deviations.

49. (currently amended) A method of manufacturing an optical system comprising a plurality of lenses, wherein at least one lens of the plurality of lenses is an optical substrate manufactured by the method ~~according to claim 40.~~comprising:

providing an interferometer apparatus having an interferometer optics providing a beam of measuring light;

polarizing the beam of measuring light such that light of the beam is substantially linearly polarized in a polarization direction which is substantially constant across a cross section of the beam;

rotating the polarization direction about an optical axis;

arranging the substrate in a beam of measuring light while rotating the polarization direction;

detecting measuring light having interacted with the substrate at plural orientations of the polarization direction about the optical axis;

interferometrically determining a surface map of the optical surface based on the detected measuring light;

determining deviations of the optical surface of the substrate from a target shape thereof in dependence of the surface map; and

machining the first surface of the optical substrate in dependence upon the determined deviations.